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IMPROVING BOILER EFFICIENCY AT THE DAYTON WATER WORKS

By H. C. Wight

In the pumping station of the Dayton water works there are two 415-horse-power boilers having an allowable steam pressure of 155 pounds and two 465-horse-power boilers with an allowable pressure of 167 pounds. All were equipped with automatic steam dampers some time ago, which were expected to increase the efficiency of operation. In fact, they are generally satisfactory with hand-fired boilers.

About two years ago the two larger boilers were equipped with automatic stokers, superheaters and soot blowers. A suspicion arose that the efficiency of these boilers could be increased. Bailey flow meters have accordingly been installed on the boilers having the stokers, and the suspicion has been shown by the charts taken by the meters to be well-founded. These charts indicate that the automatic dampers were responsible for burning about 5 per cent more coal than was necessary.

Two of these charts are reproduced diagrammatically to show what is indicated by them under the conditions existing in the Dayton plant. The record kept near the center of the chart gives the stack temperature, in degrees Fahrenheit. This is the source of the largest waste in boiler practice. The record shown on the outer part of the chart by a dotted line is in red in the original chart and gives the rate of steam flow compared with the boiler rating. It will be observed that the rate exceeds the boiler rating during a large part of the 24 hours. The solid lines record the draft and are in blue on the original chart. When the conditions are best the red and blue lines should coincide. When the blue (solid) line is above the red (dotted) line there is too much air. When the blue (solid) line is below the red (dotted) line there is too little air.

The chart of March 7, when the automatic dampers were in use most of the time, shows that at 8 o'clock in the evening the load was cut down. Nevertheless the stack temperature between 8

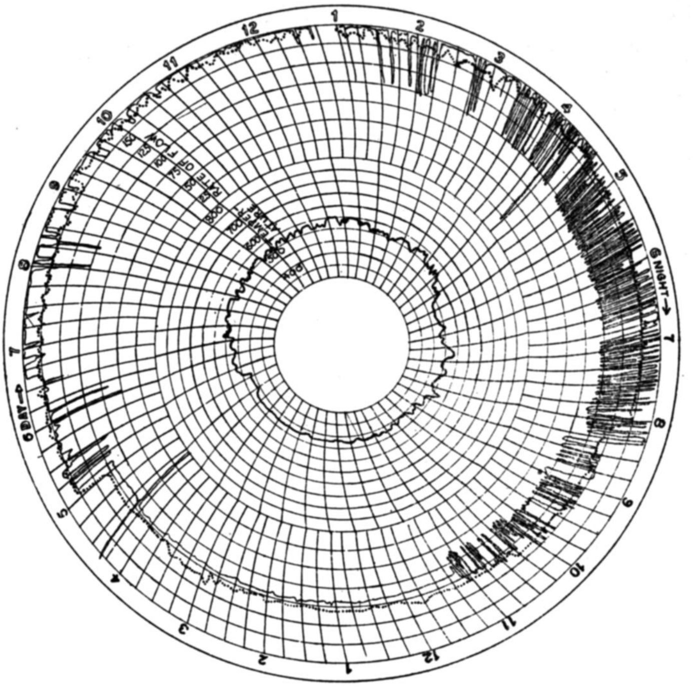

FIG. 1. BOILER METER CHART, MARCH 7, 1919

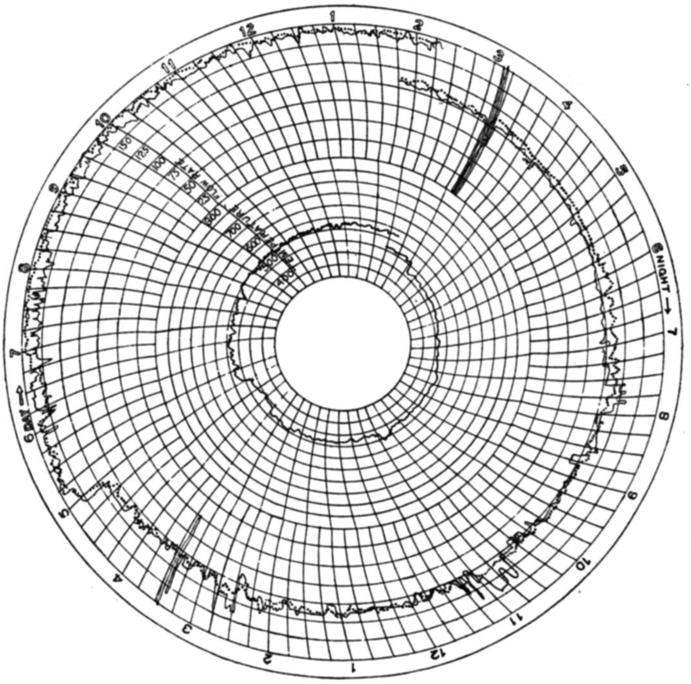

FIG. 2. BOILER METER CHART, MARCH 9, 1919

and 10 o'clock averaged higher than the average between 10 and 5 o'clock, although the gradual accumulation of soot on the flues would have made the conditions of temperature different had other features of the operation of the boilers not counter-balanced the effect of the soot. It should be observed that from 1 o'clock in the afternoon to 11 o'clock in the night of the period covered by this chart, the automatic dampers were in use, and during the remainder of the twenty-four hours, the boilers were run without them. At 4.20 in the morning the soot blowers were operated, as indicated by the long line in the draft record, and the stack temperature at once dropped 10° to 15° and remained down until the load was increased at 5 o'clock.

The chart of March 9, when the automatic draft apparatus was not used at all, shows the firemen maintaining a draft suitable to the rate of steam flow, with a correspondingly low stack temperature.